CLAIMS

What is claimed is:

1. A method of altering blocks of transform coefficients associated with input bits to provide modified blocks of transform coefficients associated with output bits, the method comprising:

identifying a first block of transform coefficients associated with the input bits;

altering the first block of transform coefficients by using a reduction ratio to generate a first block of modified transform coefficients;

generating an first updated reduction ratio;

identifying a second block of transform coefficients associated with the input bits; and

altering the second block of transform coefficients to generate a second block of modified transform coefficients using the first updated reduction ratio.

2. The method of claim 1, wherein identifying the first block of transform coefficients comprises performing variable length decoding on the input bits.

3. The method of claim 1, wherein identifying the first block of transform coefficients comprises acquiring the transform coefficients from a file.

4. The method of claim 1, wherein identifying the first block of transform coefficients comprises performing a DCT operation on video data.

5. The method of claim 1, wherein identifying the first block of transform coefficients comprises performing a DCT operation on audio data.

6. The method of claim 1, wherein the first block of transform coefficients is a block of DCT coefficients.

7. The method of claim 1, wherein the input bits identify a frame of MPEG encoded video.

8. The method of claim 7, wherein the frame is an I-frame type, B-frame type, or a P-frame type.

9. The method of claim 8, wherein the reduction ratio is determined using information associated with altering MPEG frames of the same type.

10. The method of claim 1, wherein the first updated reduction ratio is generated using information associated with altering the first block of transform coefficients.

11. The method of claim 1, wherein altering the first block of transform coefficients comprises filtering transform coefficients.

12. The method of claim 1, wherein altering the first block of transform coefficients comprises requantizing transform coefficients.

13. The method of claim 1 further comprising:

generating an second updated reduction ratio;

identifying a third block of transform coefficients associated with the input bits; and

altering the third block of transform coefficients to generate a third block of modified transform coefficients using the second updated reduction ratio, wherein altering the third block of transform coefficients allows the attainment of a target reduction ratio.

14. The method of claim 13, wherein the first updated reduction ratio is calculated using a convergence factor associated with overshoot to allow for faster convergence.

15. The method of claim 13, wherein the first updated reduction ratio is calculated to achieve the target reduction ratio after the third block.

16. The method of claim 13, wherein the first updated reduction ratio is calculated to achieve the target reduction ratio after the final block associated with the input bits.

17. The method of claim 13, wherein the first updated reduction ratio is calculated to achieve the target reduction ratio after a set number of bits.

18. The method of claim 13, wherein the first updated reduction ratio is calculated using a compensation factor, the compensation factor correcting non-linearity between the updated reduction ratio and the actual achieved reduction ratio.

19. The method of claim 13, wherein the compensation factor is determined using the reduction ratio and the picture type.

20. A method for altering transform coefficients associated with macroblocks in a frame having a frame size and a target reduction ratio, the method comprising:

identifying a number of input bits and a number of output bits associated with a set of processed macroblocks, the processed macroblocks having altered transform coefficients;

generating an updated reduction ratio using the number of input bits and the number of output bits associated with the set of processed macroblocks; and

altering transform coefficients of a next macroblock using the updated reduction ratio to allow attainment of a target reduction ratio.

21. The method of claim 20, wherein the updated reduction ratio is calculated using a convergence factor associated with overshoot to allow for faster convergence.

22. The method of claim 20, wherein the updated reduction ratio is calculated to achieve the target reduction ratio after the third block.

23. The method of claim 20, wherein the updated reduction ratio is calculated to achieve the target reduction ratio after the final block associated with the input bits.

24. The method of claim 20, wherein the updated reduction ratio is calculated to achieve the target reduction ratio after a set number of bits.

25. The method of claim 20, wherein the updated reduction ratio is calculated using a compensation factor, the compensation factor correcting non-linearity between the updated reduction ratio and the actual achieved reduction ratio.

26. The method of claim 20, wherein the compensation factor is determined using the updated reduction ratio and the picture type.

27. The method of claim 20, wherein the updated reduction ratio is greater than the target reduction ratio when the number of output bits associated with the processed macroblocks divided by the number of input bits associated with the processed macroblocks is less than the target reduction ratio.

28. The method of claim 20, wherein the updated reduction ratio is less than the target reduction ratio when the number of output bits associated with the processed macroblocks divided by the number of input bits associated with the processed macroblocks is greater than the target reduction ratio.

29. The method of claim 20, wherein the updated reduction ratio for the next macroblock is calculated using the equation:

$$R_u = (R_t b_c - (b_o - R_t b_i))/b_c$$

where

R_u is the updated reduction ratio for the next macroblock;

R_t is the target reduction ratio;

b_c is the size of the next macroblock;

b_o is the number of output bits associated with the processed macroblocks; and

b_i is the number of input bits associated with the processed macroblocks.

30. The method of claim 20, wherein the updated reduction ratio for the next macroblock is calculated using the equation:

$R_u = (R_t B_i - b_o)/(B_i - b_i)$

where

R_u is the updated reduction ratio for the next macroblock;

R_t is the target reduction ratio;

B_i is the frame size;

b_o is the number of output bits associated with the processed macroblocks; and

b_i is the number of input bits associated with the processed macroblocks.

31. The method of claim 20, wherein the update reduction ratio is calculated using a spreading factor.

32. The method of claim 31, wherein the update reduction ratio is calculated using the equation:

$R_u = (R_t(b_i + W) - b_o)/W$

where

W is the spreading factor;

R_u is the updated reduction ratio for the next macroblock;

R_t is the target reduction ratio;

b_o is the number of output bits associated with the processed macroblocks; and

b_i is the number of input bits associated with the processed macroblocks.

33. The method of claim 31, wherein the updated reduction ratio is calculated using a convergence factor.

34. The method of claim 33, wherein the update reduction ratio is calculated using the equation:

$R_u = R_t + ((1 + \alpha)(R_t b_i - b_o))/W$

where

α is the convergence factor;

R_u is the updated reduction ratio for the next macroblock;

R_t is the target reduction ratio;

W is the spreading factor;

b_o is the number of output bits associated with the processed macroblocks; and

b_i is the number of input bits associated with the processed macroblocks.

35. The method of claim 31, wherein the updated reduction ratio is calculated using a first compensation factor.

36. The method of claim 35, wherein the update reduction ratio is calculated using the equation:

$R_u = R_t + ((1 + \alpha)(R_t b_i - b_o))/W + f_d$

where

f_d is the first compensation factor;

α is the convergence factor;

R_u is the updated reduction ratio for the next macroblock;

R_t is the target reduction ratio;

W is the spreading factor;

b_o is the number of output bits associated with the processed macroblocks; and

b_i is the number of input bits associated with the processed macroblocks.

37. The method of claim 36, wherein the compensation factor is calculated using a second compensation factor associated with a frame of the same type.

38. The method of claim 37, wherein the compensation factor is calculated using the equation:

$f_d = f_d' + (R_t - B_o/B_i)$

where

f_d' is the second compensation factor for a frame of the same type;

R_t is the target reduction ratio;

B_i is the frame size;

B_o is the total output size of the frame.

39. An apparatus for altering transform coefficients associated with macroblocks in a frame having a frame size and a target reduction ratio, the apparatus comprising:

a feedback stage configured to identify a number of input bits and a number of output bits associated with a set of processed macroblocks, the processed macroblocks having altered transform coefficients, wherein the feedback stage is further configured to generate an updated reduction ratio using rate control information; and

a filtering stage coupled to the feedback stage configured to alter transform coefficients of a next macroblock using the updated reduction ratio.

40. The apparatus of claim 39, wherein the updated reduction ratio is greater than the target reduction ratio when the number of output bits associated with the processed macroblocks divided by the number of input bits associated with the processed macroblocks is less than the target reduction ratio.

41. The apparatus of claim 39, wherein the updated reduction ratio is less than the target reduction ratio when the number of output bits associated with the processed macroblocks divided by the number of input bits associated with the processed macroblocks is greater than the target reduction ratio.

42. The apparatus of claim 39, wherein the updated reduction ratio is calculated using a convergence factor associated with overshoot to allow for faster convergence.

43. The apparatus of claim 39, wherein the updated reduction ratio is calculated to achieve the target reduction ratio after the third block.

44. The apparatus of claim 39, wherein the updated reduction ratio is calculated to achieve the target reduction ratio after the final block associated with the input bits.

45. The apparatus of claim 39, wherein the updated reduction ratio is calculated to achieve the target reduction ratio after a set number of bits.

46. The apparatus of claim 39, wherein the updated reduction ratio is calculated using a compensation factor, the compensation factor correcting non-linearity between the updated reduction ratio and the actual achieved reduction ratio.

47. The apparatus of claim 39, wherein the compensation factor is determined using the updated reduction ratio and the picture type.

48. The apparatus of claim 39, wherein the updated reduction ratio for the next macroblock is calculated using the equation:

$R_u = (R_t b_c - (b_o - R_t b_i))/b_c$

where

R_u is the updated reduction ratio for the next macroblock;

R_t is the target reduction ratio;

b_c is the size of the next macroblock;

b_o is the number of output bits associated with the processed macroblocks; and

b_i is the number of input bits associated with the processed macroblocks.

49. The apparatus of claim 48, wherein the updated reduction ratio for the next macroblock is calculated using the equation:

$R_u = (R_t B_i - b_o)/(B_i - b_i)$

where

R_u is the updated reduction ratio for the next macroblock;

R_t is the target reduction ratio;

B_i is the frame size;

b_o is the number of output bits associated with the processed macroblocks; and

b_i is the number of input bits associated with the processed macroblocks.

50. The apparatus of claim 39, wherein the update reduction ratio is calculated using a spreading factor.

51. The apparatus of claim 50, wherein the update reduction ratio is calculated using the equation:

$R_u = (R_t(b_i + W) - b_o)/W$

where

W is the spreading factor;

R_u is the updated reduction ratio for the next macroblock;

R_t is the target reduction ratio;

b_o is the number of output bits associated with the processed macroblocks; and

b_i is the number of input bits associated with the processed macroblocks.

52. The apparatus of claim 50, wherein the updated reduction ratio is calculated using a convergence factor.

53. The apparatus of claim 52, wherein the update reduction ratio is calculated using the equation:

$R_u = R_t + ((1 + \alpha)(R_t b_i - b_o))/W$

where

α is the convergence factor;

R_u is the updated reduction ratio for the next macroblock;

R_t is the target reduction ratio;

W is the spreading factor;

b_o is the number of output bits associated with the processed macroblocks; and

b_i is the number of input bits associated with the processed macroblocks.

54. The apparatus of claim 50, wherein the updated reduction ratio is calculated using a first compensation factor.

55. The apparatus of claim 54, wherein the update reduction ratio is calculated using the equation:

$$R_u = R_t + ((1 + \alpha)(R_t b_i - b_o))/W + f_d$$

where

f_d is the first compensation factor;

α is the convergence factor;

R_u is the updated reduction ratio for the next macroblock;

R_t is the target reduction ratio;

W is the spreading factor;

b_o is the number of output bits associated with the processed macroblocks; and

b_i is the number of input bits associated with the processed macroblocks.

56. The apparatus of claim 54, wherein the compensation factor is calculated using a second compensation factor associated with a frame of the same type.

57. The apparatus of claim 56, wherein the compensation factor is calculated using the equation:

$$f_d = f_d' + (R_t - B_o/B_i)$$

where

f_d' is the second compensation factor for a frame of the same type;

R_t is the target reduction ratio;

B_i is the frame size;

B_o is the total output size of the frame.

58. A computer readable medium comprising computer code for altering blocks of transform coefficients associated with input bits to provide modified blocks of transform coefficients associated with output bits, the computer readable medium comprising:

computer code for identifying a first block of transform coefficients associated with the input bits;

computer code for altering the first block of transform coefficients by using a reduction ratio to generate a first block of modified transform coefficients;

computer code for generating an updated reduction ratio;

computer code for identifying a second block of transform coefficients associated with the input bits; and

computer code for altering the second block of transform coefficients to generate a second block of modified transform coefficients using the updated reduction ratio.

59. The computer readable medium of claim 58, wherein identifying the first block of transform coefficients comprises performing variable length decoding on the input bits.

60. The computer readable medium of claim 58, wherein identifying the first block of transform coefficients comprises acquiring the transform coefficients from a file.

61. The computer readable medium of claim 58, wherein identifying the first block of transform coefficients comprises performing a DCT operation on video data.

62. The computer readable medium of claim 58, wherein identifying the first block of transform coefficients comprises performing a DCT operation on audio data.

63. The computer readable medium of claim 58, wherein the first block of transform coefficients is a block of DCT coefficients.

64. The computer readable medium of claim 58, wherein the input bits identify a frame of MPEG encoded video.

65. An apparatus for altering blocks of transform coefficients associated with input bits to provide modified blocks of transform coefficients associated with output bits, the computer readable medium comprising:

means for identifying a first block of transform coefficients associated with the input bits;

means for altering the first block of transform coefficients by using a reduction ratio to generate a first block of modified transform coefficients;

means for generating an updated reduction ratio;

means for identifying a second block of transform coefficients associated with the input bits; and

means for altering the second block of transform coefficients to generate a second block of modified transform coefficients using the updated reduction ratio.

66. The apparatus of claim 65, wherein identifying the first block of transform coefficients comprises performing variable length decoding on the input bits.

67. The apparatus of claim 65, wherein identifying the first block of transform coefficients comprises acquiring the transform coefficients from a file.

68. The apparatus of claim 65, wherein identifying the first block of transform coefficients comprises performing a DCT operation on video data.

69. The apparatus of claim 65, wherein identifying the first block of transform coefficients comprises performing a DCT operation on audio data.

70. The apparatus of claim 65, wherein the first block of transform coefficients is a block of DCT coefficients.

71. The apparatus of claim 65, wherein the input bits identify a frame of MPEG encoded video.

72. The apparatus of claim 65, wherein generating an updated reduction ratio comprises using a spreading factor.

73. The apparatus of claim 65, wherein generating an updated reduction ratio comprises using a convergence factor.

74. The apparatus of claim 65, wherein generating an updated reduction ratio comprises using a compensation factor.